

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated March 17, 2008. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

As outlined above, claims 1-5, 7-15, 17-24, and 26-29 stand for consideration in this application, wherein claims 1, 11, and 21 are being amended.

All amendments to the application are fully supported therein. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

The First 35 U.S.C. §103(a) Rejection

Claims 1, 2, 4, 5, 8, 11, 13-15, and 18 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow (U.S. Pat. No. 4,219,072) in view of Stuecheli (GB 2,049,922). Applicants respectfully traverse this rejection for the reasons set forth below.

Claim 1

A heat storage unit as recited in claim 1 comprises a supply pipe and a discharge pipe. The supply pipe supplies and releases the heat exchange medium into the storage container. A discharge pipe discharges said heat exchange medium housed in said storage container to the outside of said storage container. Said supply pipe crosses a boundary surface between said heat exchange medium and said heat storage body housed in said storage container and has a plurality of discharge holes that discharge said supplied heat exchange medium, and at least one of said discharge holes is positioned inside said heat exchange medium. At least a part of said discharge pipe extends in a horizontal direction. A first connection port of said supply pipe is positioned above a second connection port of said discharge pipe. The first connection port and the second connection port are configured to connect the heat storage unit with a heat exchanger. In the heat storage unit as recited in claim 1, heat is exchanged by directly contacting the heat exchange medium, which is released from the supply pipe, to the heat storage body in the container. The features recited in claim 1 can eliminate a pressure difference between the outside and the inside of the heat storage unit even when the

supply pipe and the discharge pipe are removed from the heat exchanger in a wrong procedure. Consequently, a heat storage body can be prevented from flowing inversely from the supply pipe. (See paragraphs [0031]-[0032] of the specification.)

Barlow shows that heat is exchanged between a heat transfer fluid 52 and a phase change material 86 in a container by intimately associating or directly contacting the heat transfer fluid 52 with the phase change material 86. (See Abstract and Fig. 6.) In Barlow, an inlet conduit 18 supplies and releases the heat transfer fluid 52 into a container via discharge means 20, while an outlet conduit 46 discharges the heat transfer fluid to the outside of the container. (See col. 7, lines 11-21 and lines 61-65.) However, as admitted by the Examiner Barlow does not show or suggest that a first connection port of the inlet conduit 18 is positioned above a second connection port of the outlet conduit 46, and at least a part of the outlet conduit 46 extends in a horizontal direction. Also, Barlow does not show or suggest that the first connection port and the second connection port are configured to connect a phase change material heat exchanger 50 with a heat exchanger.

Stuecheli is directed to an apparatus for achieving heat exchange in a latent heat store 10 between a heat storage medium 14 and a heat vehicle medium 37 by way of a heat transfer surface 30. (See Abstract (57).) Because the line 38 does not release the heat vehicle medium 37 into a tank 12, the heat vehicle medium 37 is circulated in a closed line consisting of a line 32, a circulating pump 34, a solar collector 36, and a line 38. (See page 2, lines 49-53 and Fig. 1.) Accordingly, the latent heat storage medium 14 in the bottom part of the tank 12 is heated up by way of the heat transfer surface 30, NOT by directly contacting the heat vehicle medium 37 to the heat storage medium 14.

As such, the mechanism of heat exchange shown in Steucheli is clearly different from that of the heat storage unit shown in Barlow. Thus, the structure and arrangement of the lines 32 and 38 shown in Stuecheli are not applicable to the outlet conduit 46 and the inlet conduit 18 shown in Barlow. Also, one of ordinary skill in the art would not have modified Barlow's apparatus so as to have the structure and arrangement of the lines 32 and 38 shown in Stuecheli, because to do so would have destroyed the operability and utility of Barlow's construction for releasing the heat transfer fluid from the inlet conduit into the container to directly contact the heat transfer fluid to the phase change material.

Accordingly, claim 1 is not obvious in view of all the prior art cited.

Claim 11

Claim 11 has substantially the same features as those of claim 1. As such, the arguments set forth above are equally applicable here. Accordingly, claim 11 must also not be obvious in view of all the prior art cited.

Claims 2, 4, 5, 8, 13-15, 18

As to dependent claims 2, 4, 5, 8, 13-15, and 18, the arguments set forth above with respect to independent claims 1 and 11 are equally applicable here. Accordingly, claims 2, 4, 5, 8, 13-15, and 18 must also must not be obvious in view of all the prior art cited.

The Second 35 U.S.C. §103(a) Rejection

Claims 1-4, 11, and 14 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Lindner et al. (U.S. Pat. No. 4,086,958) in view of Stuecheli. Applicants respectfully traverse this rejection for the reasons set forth below.

Claim 1

Lindner shows that heat is exchanged between a first medium 22 and a second medium 28 by bubbling the first medium 22 through the second medium 28 and directly contacting the first medium 22 with the second medium 28. (See Fig. 3 and col. 2, lines 12-13.) In Lindner, a supply conduit 23 supplies the first medium into a vessel 21 via a by-pass conduit 31 and a by-pass branch conduit 33, while a return conduit 29 discharges the second medium outside the vessel 21. (See Fig. 3 and col. 3, line 57 – col. 4, line 15.) However, Lindner does not show or suggest that a first connection port of the supply conduit 23 is positioned above a second connection port of the return conduit 29, and at least a part of the return conduit 29 extends in a horizontal direction. Also, Barlow does not show or suggest that the first connection port and the second connection port are configured to connect a heat exchanger apparatus with a heat exchanger.

As set forth above, the mechanism of heat exchange shown in Stuecheli is clearly different from that shown in Lindner as well as Barlow. Therefore, the structure and arrangement of the lines 32 and 38 are not applicable to the return conduit 29 and the supply conduit 33 shown in Lindner. Also, one of ordinary skill in the art would not have modified Lindner's apparatus so as to have the structure and arrangement of the lines 32 and 38 shown in Stuecheli, because to do so would have destroyed the operability and utility of Lindner's construction for releasing the first medium from the supply conduit into the container to directly contact the first medium to the second medium.

Accordingly, claim 1 is not obvious in view of all the prior art cited.

Claim 11

Claim 11 has substantially the same features as those of claim 1. As such, the arguments set forth above are equally applicable here. Accordingly, claim 11 must also not be obvious in view of all the prior art cited.

Claims 2-4, 14

As to dependent claims 2-4 and 14, the arguments set forth above with respect to independent claims 1 and 11 are equally applicable here. Accordingly, claims 2-4 and 14 must also not be obvious in view of all the prior art cited.

The Third 35 U.S.C. §103(a) Rejection

Claims 10 and 20 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli, and further in view of Kakiuchi et al. (U.S. Patent No. 5,785,885). This rejection is respectfully traversed for the reasons set forth below.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claims 1 and 11, from which claims 10 and 20 depend. The tertiary reference of Kakiuchi is directed to a heat storage material composition. Kakiuchi fails to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was made, one of ordinary skill in the art could not and would not achieve all the features as recited in claims 1 and 11, from which claims 10 and 20 depend.

Accordingly, claims 10 and 20 are not obvious in view of all the prior art cited.

The Fourth 35 U.S.C. §103(a) Rejection

Claims 7 and 17 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli, and further in view of Noji et al. (U.S. Patent No. 4,953,330). This rejection is respectfully traversed for the reasons set forth below.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claims 1 and 11, from which claims 7 and 17 depend. The tertiary reference of Noji is directed to a damping device for preventing the horizontal vibration of a structure from wind and earthquakes. Noji fails to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was

made, one of ordinary skill in the art could not and would not achieve all the features as recited in claims 1 and 11, from which claims 7 and 17 depend.

Accordingly, claims 7 and 17 are not obvious in view of all the prior art cited.

The Fifth 35 U.S.C. §103(a) Rejection

Claims 9 and 19 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli, and further in view of Strasser (WO 03/019099). This rejection is respectfully traversed for the reasons set forth below.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claims 1 and 11, from which claims 9 and 19 depend. The tertiary reference of Strasser shows that a discharging system 9 is positioned below a withdrawal conduit 5. In other words, Strasser fails to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was made, one of ordinary skill in the art could not and would not achieve all the features as recited in claims 1 and 11, from which claims 9 and 19 depend.

Accordingly, claims 9 and 19 are not obvious in view of all the prior art cited.

The Sixth 35 U.S.C. §103(a) Rejection

Claims 12, 21-24, and 27 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli, and further in view of Strähle et al. (U.S. Pat. No. 6,056,043). This rejection is respectfully traversed for the reasons set forth below.

Claim 21 has substantially the same features as those of claim 1. As such, the arguments with respect to Barlow and Stuecheli set forth above are equally applicable to claim 21.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claims 11, from which claim 12 depends, and claim 21, from which claims 22-24 and 27 depend. The tertiary reference of Strähle fails to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was made, one of ordinary skill in the art could not and would not achieve all the features as recited in claims 11, from which claim 12 depends, and claim 21, from which claims 22-24 and 27 depend.

Accordingly, claims 12, 21-24, and 27 are not obvious in view of all the prior art cited.

The Seventh 35 U.S.C. §103(a) Rejection

Claim 26 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli and Strähle, and further in view of Noji.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claim 21, from which claim 26 depends. As set forth above, Strähle and Noji fail to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was made, one of ordinary skill in the art could not and would not achieve all the features as recited in claim 21, from which claim 26 depends.

Accordingly, claim 26 is not obvious in view of all the prior art cited.

The Eighth 35 U.S.C. §103(a) Rejection

Claim 28 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli and Strähle, and further in view of Strasser.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claim 21, from which claim 28 depends. As set forth above, Strähle and Strasser fail to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was made, one of ordinary skill in the art could not and would not achieve all the features as recited in claim 21, from which claim 28 depends.

Accordingly, claim 28 is not obvious in view of all the prior art cited.

The Ninth 35 U.S.C. §103(a) Rejection

Claim 29 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Barlow in view of Stuecheli and Strähle, and further in view of Kakiuchi.

As set forth above, Barlow in view of Stuecheli fails to teach all the elements recited in claim 21, from which claim 29 depends. As set forth above, Strähle and Kakiuchi fail to provide any disclosure, teaching or suggestion that makes up for the deficiencies in Barlow in view of Stuecheli. Therefore, at the time the invention was made, one of ordinary skill in the art could not and would not achieve all the features as recited in claim 21, from which claim 29 depends.

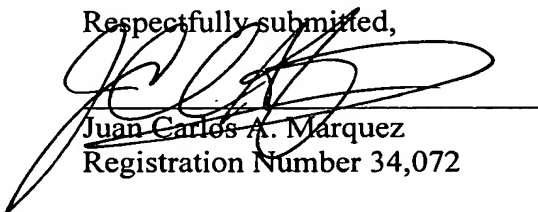
Accordingly, claim 29 is not obvious in view of all the prior art cited.

Conclusion

In light of the above-outlined Amendments and Remarks, Applicants respectfully request early and favorable action with regard to the present application, and a Notice of Allowance for all pending claims is earnestly solicited.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,



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